Turban, Aronson, and Liang
Decision Support Systems and Intelligent Systems, Seventh Edition

Chapter 3



© 2005 Prentice Hall, Decision Support Systems and Intelligent Systems, 7th Edition, Turban, Aronson, and Liang



Learning Objectives

- Understand DSS configurations.
- Learn characteristics and capabilities of DSS.
- Understand DSS components.
- Describe structure of DSS components.
- Understand how DSS and the Web interact.
- Learn the role of the user in DSS.
- Understand DSS hardware and integration.
- Learn DSS configurations.



Decision Support Systems

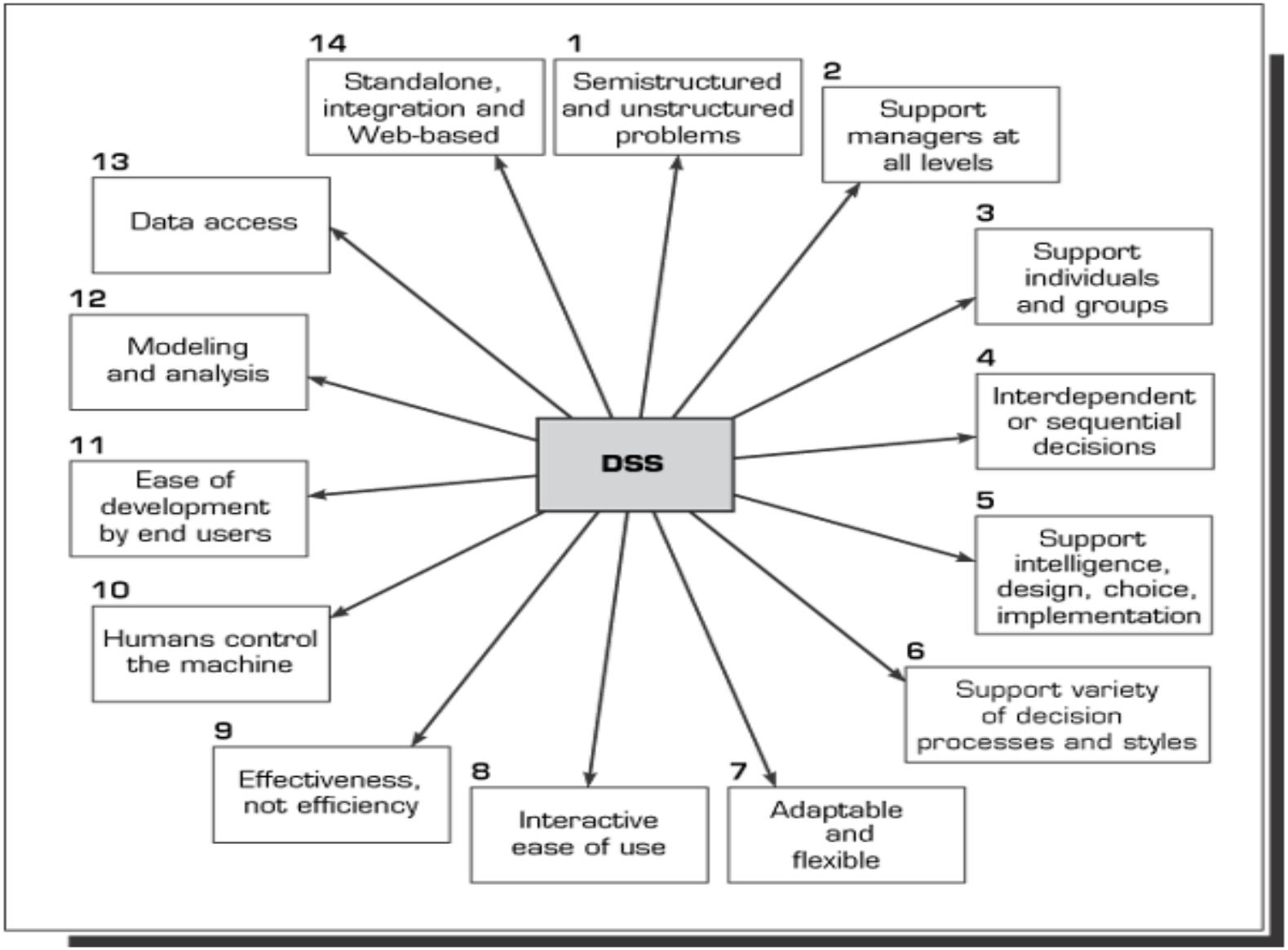
- Systems designed to support managerial decision-making in unstructured problems
- More recently, emphasis has shifted to inputs from outputs
- Mechanism for interaction between user and components
- Usually built to support solution or evaluate opportunities

© 2005 Prentice Hall, Decision Support Systems and Intelligent Systems, 7th Edition, Turban, Aronson, and Liang

DSS

- A DSS is a methodology that supports decision-making.
- It is:
 - Flexible;
 - Adaptive;
 - Interactive;
 - GUI-based;
 - Employs modeling.

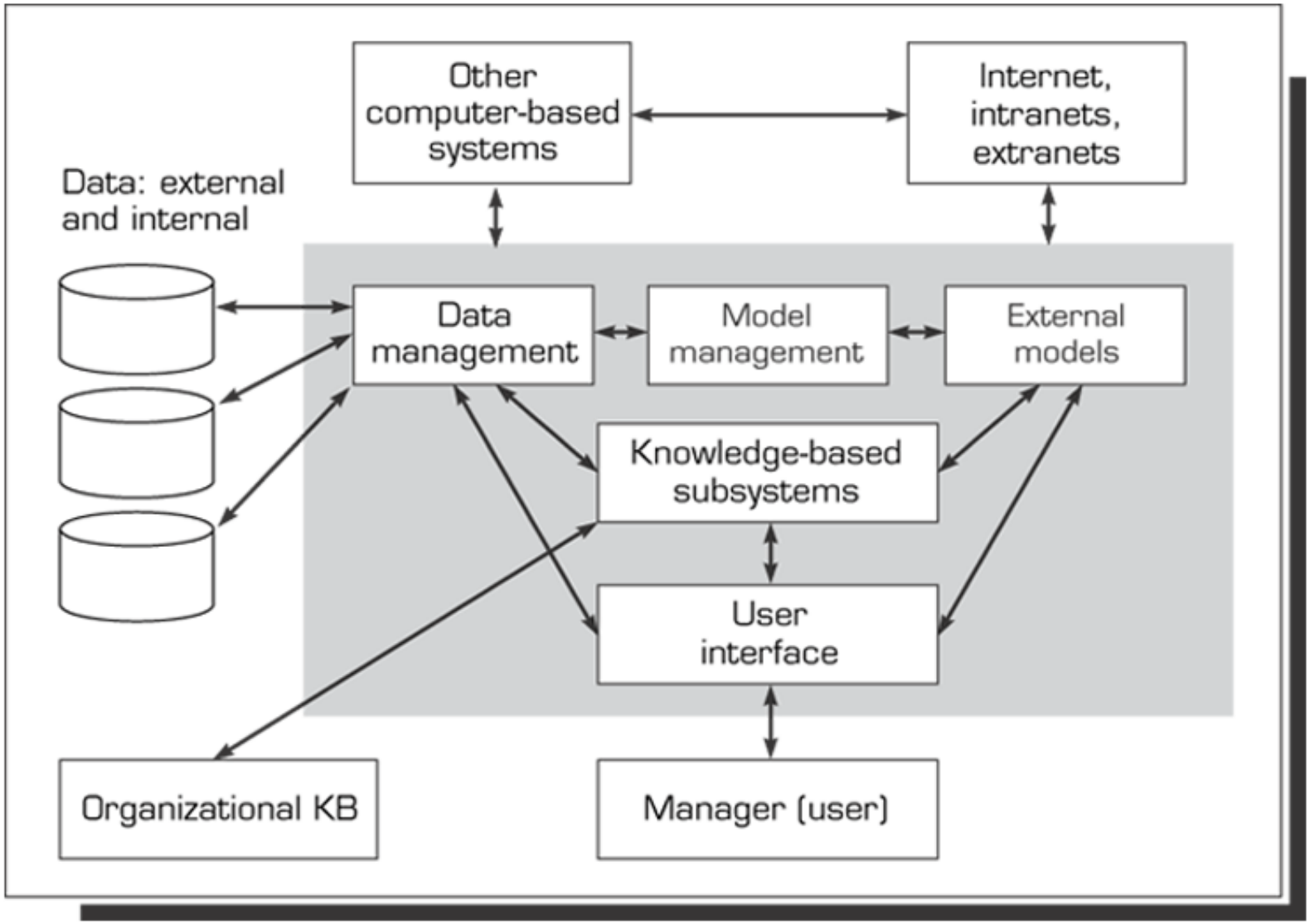
Figure 3.2 Key Characteristics and Capabilities of DSS



Components of DSS

- Subsystems:
 - Data management
 - Managed by DBMS
 - Model management
 - Managed by MBMS
 - User interface
 - Knowledge Management and organizational knowledge base

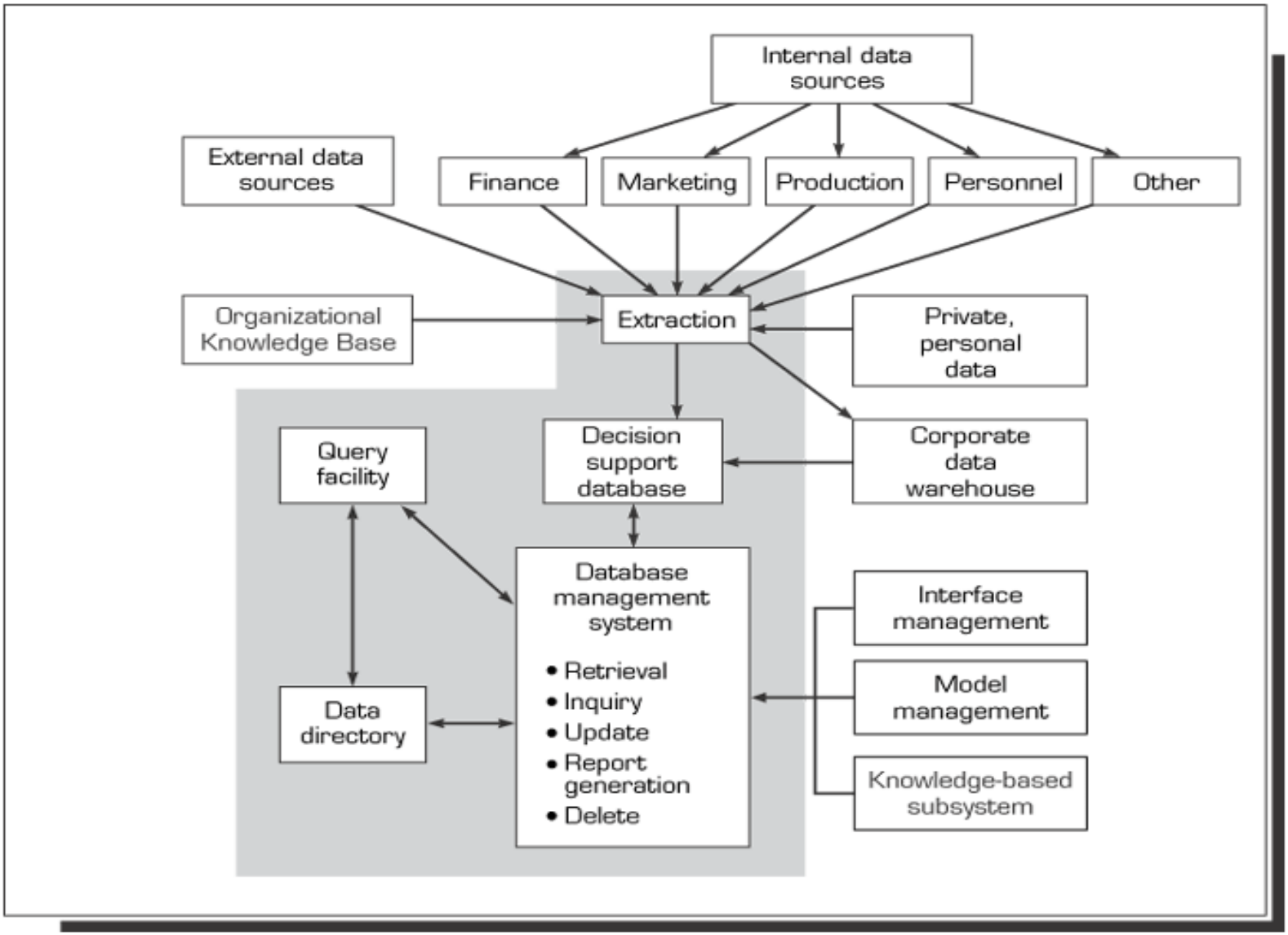
Figure 3.3 A Schematic View of DSS



Data Management Subsystem

- Components:
 - Database
 - Database management system(DBMS)
 - Data directory(dictionary)
 - Query facility

Figure 3.4 The Structure of the Data Management Subsystem



Database

- Interrelated data extracted from various sources, stored for use by the organization, and queried
 - Internal data, usually from TPS
 - External data from government agencies, trade associations, market research firms, forecasting firms
 - Private data or guidelines used by decision-makers

Database Management System

- Extracts data
- Manages data and their relationships
- Updates (add, delete, edit, change)
- Retrieves data (accesses it)
- Queries and manipulates data
- Employs data dictionary

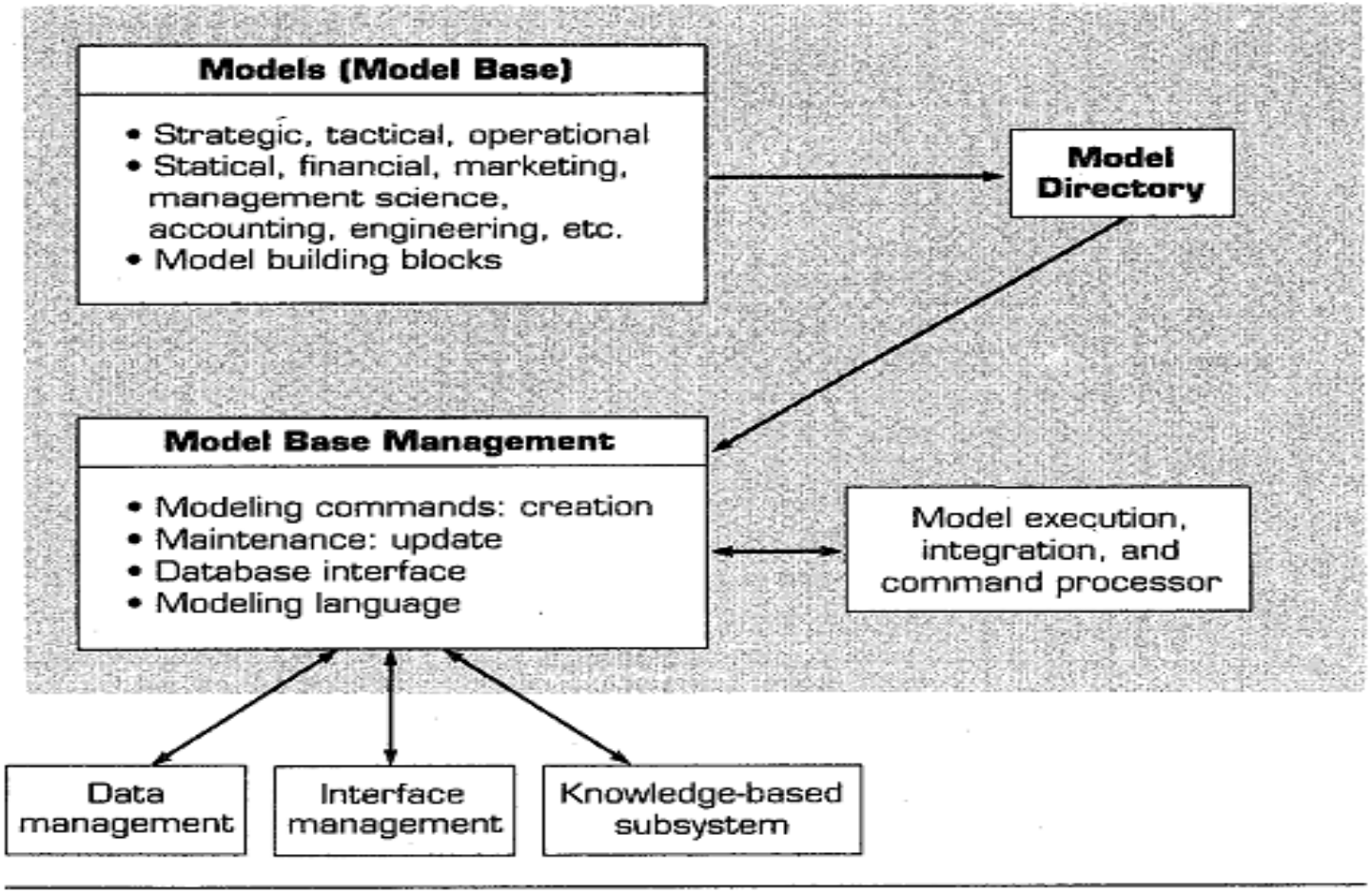
Data Directory

- Catalog of all data
 - Contains data definitions
 - Answers questions about the availability of data items such as:
 - Source of data
 - Meaning of data
 - Allows for additions, removals, and alterations

Model Management Subsystem

- Components:
 - Model base
 - Model base management system(MBMS)
 - Modeling language
 - Model directory
 - Model execution, integration, and command processor

Structure of the Model Management System



© 2005 Prentice Hall, Decision Support Systems and Intelligent Systems, 7th Edition, Turban, Aronson, and Liang

Models

- Strategic
 - Supports top management decisions
- Tactical
 - Used primarily by middle management to allocate and control resources
- Operational
 - Supports daily(day-to-day) work activities
- Analytical
 - Used to perform analysis of data

© 2005 Prentice Hall, Decision Support Systems and Intelligent Systems, 7th Edition, Turban, Aronson, and Liang

Model Base Management System

- Functions:
 - Model creation
 - Model updates
 - Model data manipulation
 - Generation of new routines
- Model directory:
 - Catalog of models
 - Contains model definition and its function.

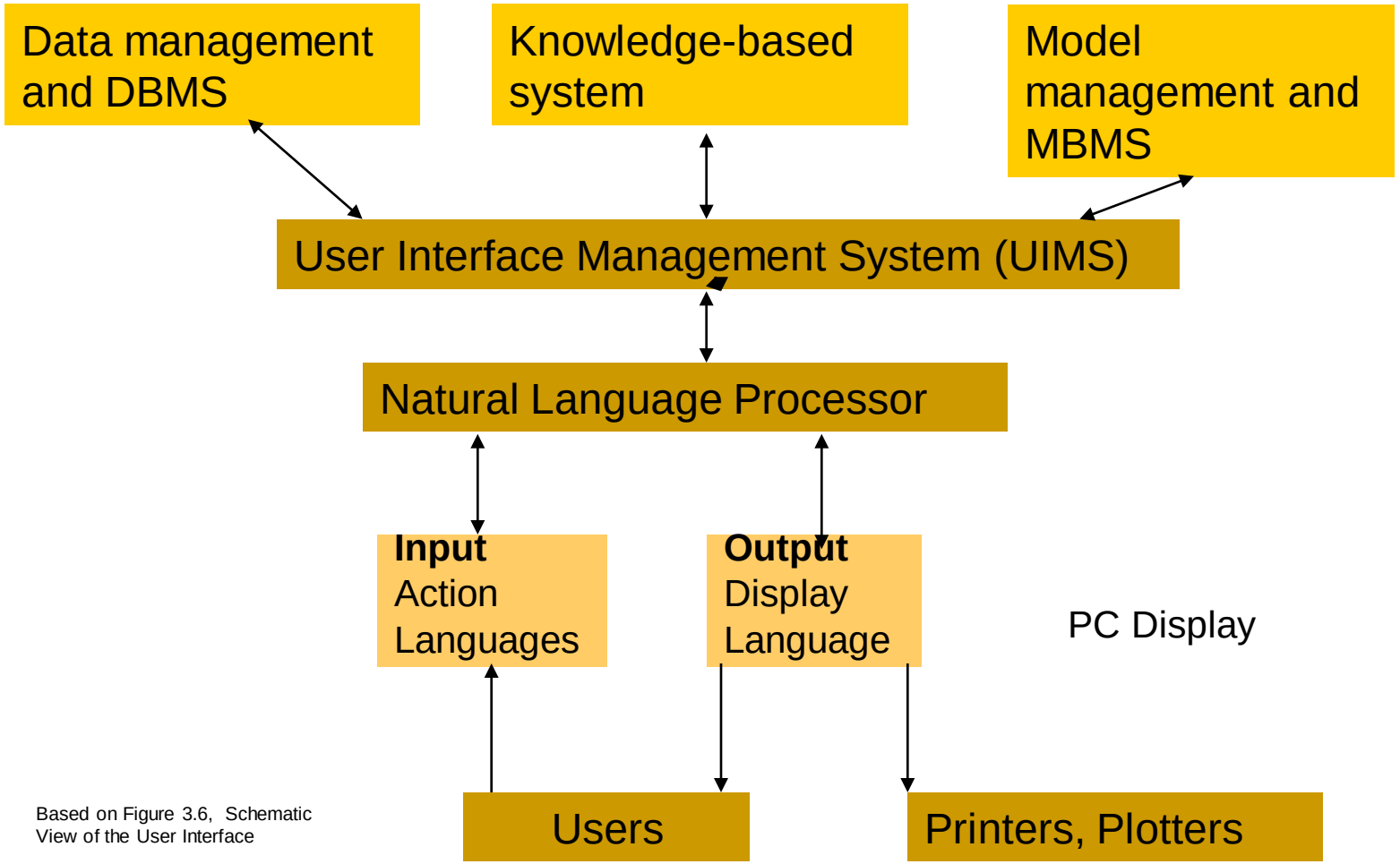
Model Management Activities

- Model execution
 - Controls running of model
- Model command processor
 - Receives model instructions from user interface (acceptation and interpretation)
 - Routes instructions to MBMS or module execution or integration functions
- Model integration
 - Combines several models' operations

User Interface Management (Dialog) SubSystem-UIMS

- GUI
- Natural language processor
- Interacts with model management and data management subsystems
- Examples
 - Speech recognition
 - Display panel
 - Tactile interfaces (touch based interfaces)
 - Gesture interface (NEW!)

User Interface System



Based on Figure 3.6, Schematic View of the User Interface

UIMS Capabilities

- Provides a graphical user interface, frequently using a Web browser
- Accommodates the user with a variety of input devices
- Presents data with a variety of formats and output devices
- Gives users help capabilities, prompting, diagnostic, and suggestion routines, or any other flexible support
- Provides interactions with the database and the model base
- Stores input and output data
- Provides color graphics, three-dimensional graphics, and data plotting
- Has windows that allow multiple functions to be displayed concurrently
- Can support communication among and between users and builders of MSS
- Provides training by example (guiding users through the input and modeling processes)
- Provides flexibility and adaptiveness so the MSS can accommodate different problems and technologies
- Interacts in multiple, different dialog styles
- Captures, stores, and analyzes dialog usage (tracking) to improve the dialog system; tracking by user is also available



End



Knowledge-Based Management System

- Many unstructured and even semistructured problems are so complex that their solutions require expertise.
- This can be provided by an expert system or other intelligent system.
- Therefore, more advanced DSS are equipped with a component called a knowledge-based management subsystem.
- This component can supply the required expertise for solving some aspects of the problem and provide knowledge that can enhance the operation of DSS.
- Such as selecting a model class or a solution methodology.
- The knowledge component consists of one or more intelligent systems.
- intelligent system example is ANN.
- Expert systems use rule induction methods.

DSS Hardware

- De facto standard hardware
- Web server with DBMS:
 - Operates using browser
 - Data stored in variety of databases
 - Can be mainframe, server, workstation, or PC
 - Any network type
 - Access for mobile devices



DSS Classifications

- Alter
 - The extent to which outputs can directly support or determine the decision
 - Data oriented or model oriented
 - Seven categories.
- Holsapple and Whinston
 - Text oriented, database oriented, spreadsheet oriented, solver oriented, rule oriented, or compound.



Alter classification

TABLE 3.4 Characteristics of Different Classes of Decision Support Systems

Orientation	*Category*	*Type of Operation*	*Type of Task*	*User*	*Usage Pattern*	*Time*
Data	File drawer systems	Access data items	Operational	Nonmanagerial line personnel	Simple inquiries	Irregular
	Data analysis systems	Ad hoc analysis of data files	Operational analysis	Staff analyst or managerial line personnel	Manipulation and display of data	Irregular or periodic
Data or Models	Analysis information systems	Ad hoc analysis involving multiple databases and small models	Analysis, planning	Staff analyst	Programming special reports, developing small models	Irregular, on request
Models	Accounting models	Standard calculations that estimate future results on the basis of accounting definitions	Planning, budgeting	Staff analyst or manager	Input estimates of activity; receive estimated monetary results as output	Periodic (e.g., weekly, monthly, yearly)
	Representational models	Estimating consequences of particular actions	Planning, budgeting	Staff analyst	Input possible decision; receive estimated results as output	Periodic or irregular (ad hoc analysis)
	Optimization models	Calculating an optimal solution to a combinatorial problem	Planning, resource allocation	Staff analyst	Input constraints and objectives; receive answer	Periodic or irregular (ad hoc analysis)
	Suggestion models	Performing calculations that generate a suggested decision	Operational	Nonmanagerial line personnel	Input a structured description of the decision situation; receive a suggested decision as output	Daily or periodic

Source: Condensed from Alter (1980), pp. 90–91.



Holsapple and Whinston Classification

TEXT-ORIENTED DSS

- Information (including data and knowledge) is often stored in a textual format and must be accessed by decision-makers. Therefore, it is necessary to represent and process text documents and fragments effectively and efficiently.
- A text-oriented DSS supports a decision-maker by electronically keeping track of textually represented information that could have a bearing on decisions. It allows documents to be electronically created, revised, and viewed as needed.
- Information technologies such as Web-based document imaging, and hypertext can be incorporated into text-oriented DSS applications.
- There are many text-oriented DSS applications. Among them are electronic document management systems, knowledge-management, content management, and business rules systems. Content management systems (CMS) are used to manage the material posted on Web sites.

DATABASE-ORIENTED DSS

- the database organization plays a major role in the DSS structure.
- A database-oriented DSS features strong report generation and query capabilities.

SPREADSHEET-ORIENTED DSS

- A spreadsheet is a modeling system that allows the user to develop models to execute DSS analysis. These models not only create, view, and modify procedural knowledge.
- The most popular end user tool for developing DSS is Microsoft Excel. Excel includes dozens of statistical packages, a linear programming package (solver), and many financial models.
- Some spreadsheet development tools include what-if analysis and goal-seeking capabilities.
- A spreadsheet-oriented DSS is a special case of a solver-oriented DSS.

SOLVER-ORIENTED DSS

- A solver is an algorithm or procedure written as a computer program for performing certain computations for solving a particular problem type.
- A solver can be commercially programmed in development software. For example, Excel, includes several powerful solvers-functions and procedures-that solve a number of standard business problems.
- The DSS builder can incorporate the solvers in creating the DSS application. Solvers can be written in a programming language such as C++; they can be written directly on or can be an add-in tool in a spreadsheet, or they can be embedded in a specialized modeling language, such as Lingo.

Other DSS Classifications

- Donovan and Madnick
 - Institutional DSS: supports problems of recurring nature(repetitive)
 - Ad hoc DSS: supports problems that are are not repetitive(not expected to reoccur).
- Hackathorn and Keen
 - Personal DSS
 - group DSS
 - organizational DSS



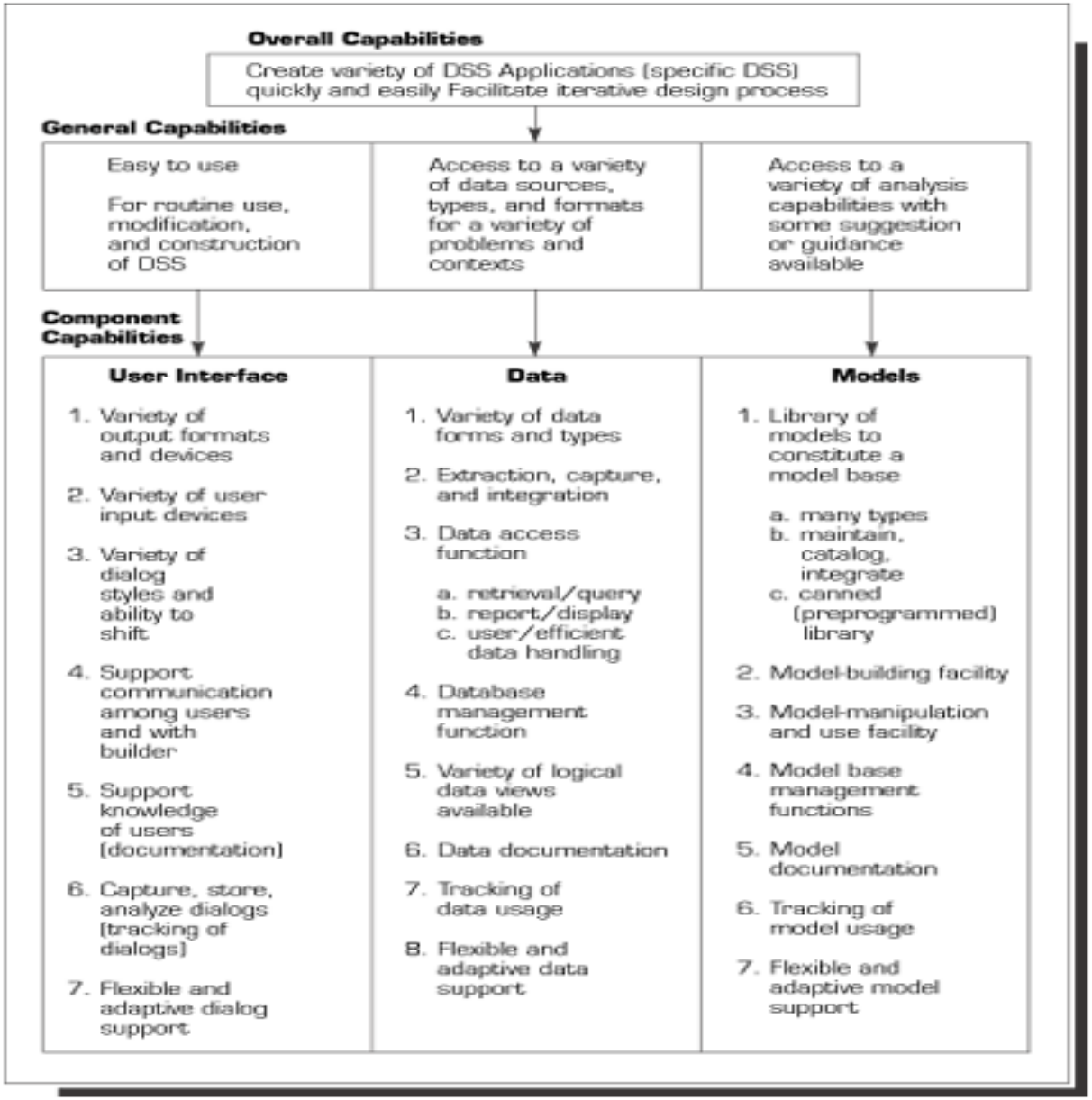
DSS Classifications

- GSS v. Individual DSS
 - Decisions made by entire group or by individual decision maker
- Custom made versus vendor ready made
 - Many DSS are custom-made for individual users and organizations.
 - However, Generic DSS (ready made) may be modified for use
 - Database, models, interface, support are built in.
 - Addresses repeatable industry problems.
 - Reduces costs.

Web and DSS

- The Web can be used for collecting both external and internal data for the DSS database.
- The Web can be used for communication and collaboration among DSS builders, users, and management.
- In addition, the Web can be used to download DSS software, use DSS applications provided by the company, or buy online from application service providers (ASPs).
- The standard DSS interface is now the Web browser, or at least a similar-looking screen.

Figure 3.7 Summary of DSS Capabilities



Source: Based on Ralph Sprague and Eric Carlson, *Building Effective Decision Support Systems*, 1982, p. 313. Reprinted by permission of Prentice Hall, Inc.

© 2005 Prentice Hall, Decision Support Systems and Intelligent Systems, 7th Edition, Turban, Aronson, and Liang

Assignment

- On the World Wide Web, find a DSS/ business intelligence/business analytics software vendor with downloadable demo software. Download the software, install it, and test it. Report your findings to the class and demonstrate the software's capabilities.